series 200

Sci-Plus

scientific calculator

Owner's manual

How to perform scientific, statistical and trignometric calculations with your Sci-Plus calculator.

The Sci – Plus 200 Scientific Calculator allows you to perform a wide range of mathematical, trigonometric and statistical calculations. This manual describes how to perform these operations and care for your calculator.

Battery and charging information

The internal lithium-Ion battery in your calculator will normally provide operation for more than 80 hours, but must be recharged when “BAT LO” is displayed. It is also recommended that the battery be recharged if an extended period of storage is expected. Insert the charger jack into

the charge socket on the left side of the calculator then plug the charger into an outlet. A full charge will take 8 - 10 hours. After long periods of storage (5 – 6 months) the battery may become fully discharged and the calculator will remain inoperative until the battery has recovered normal operating voltage. If the calculator does not function after charging, it must be returned to an authorized service centre for the battery to be replaced.

Alternate wall adapter plugs can be provided for most countries – please contact Sight Enhancement Systems if you need a different plug for your country.

Basic Operations

Turning the Calculator On and Off

To turn the calculator on, press the **[AC/ON]** key. The calculator starts with all memory cleared, the angle units set to degrees, and the display shows "**0".**

To turn the calculator off, press the **[OFF]** key. After power down, all memory is cleared.

Key	**Function**
[AC/ON]	Turns calculator on, clears memory and display, and resets angle units to degrees.
. **[2^{nd}]**	Instructs calculator to perform the second **[2^{nd}]** function of the next key that is pressed (the function in yellow text on the key).

Key	**Function**
[CE/C]	When pressed once during a calculation (but before an operation key), clears the display entry and any error condition **("E").** Pressing **[CE/C]** does **not** clear the memory, the statistics register, or the angle unit setting.

The Display

A maximum of eight digits can be shown on the display. Any additional digits entered will be ignored.

The calculator display has been manufactured to provide the highest contrast for viewing in normal room lighting. To obtain the best clarity it should be viewed at a slight angle.

The display also provides status indicators as described in the following table.

Indicator	**Meaning**
"–"	The displayed number has a negative value
"2nd"	The **[2nd]** key has been pressed. The next key that is pressed will perform the function in yellow text on the key.
"D"	Angle units are set to degrees.
"R"	Angle units are set to radians
"G"	Angle units are set to grads

Indicator	**Meaning**
“( )”	One or more parentheses are open
“STAT”	The calculator is in its statistics mode, and the statistics register contains data.
“K”	A number and operation are stored as a constant
“M”	A number is stored in the memory.
“E”	An error has occurred, **[CE/C]** to reset.

Scientific Notation

When using scientific notation, numbers are expressed as a mantissa multiplied by 10 to an exponential power (exponent).

Entering a Number in Scientific Notation

Enter the mantissa. If it is negative, use the **[+/-]** key to change the sign. Press **[EE].** Two zeros will appear on the right side of the display. Enter the numerical exponent (one or two digits). If the exponent is negative, use the **[+/-]** key to

change the sign. If you make a mistake entering the exponent, simply re-enter the correct digits.

For example, 2.567×10^6 is entered as **2.567 [EE] 6**, and is displayed as **2.567 06.**

To revert to standard decimal press **[2nd] [-EE-].**

Converting a Number to Scientific Notation

To convert any displayed number from standard display format to scientific notation, press **[EE]** followed by **[=].**

Correcting Entry Errors

At any point during a calculation, you can press **[AC/ON]** to clear all calculations, including any erroneous entries, and start all over.

Clearing an Error Condition

The display shows "**E**" whenever an error, overflow, or underflow occurs, or an improper operation attempted. No further key commands will be accepted until the error condition is cleared. Pressing **[CE/C]** clears the error and all pending operations.

Order of Calculations

The **Sci – Plus 200** Scientific Calculator completes operations in accordance with the following order of priority:

1. **Single-variable functions** -- including trigonometric, logarithmic, square, square root, factorial, percent, reciprocal, angle conversion, and sign change.
2. **Two variable functions** -- including exponential (y^x) and roots ($\sqrt[x]{y}$), multiplication and division, addition and subtraction.
3. **Pressing [=]** completes all operations.

Basic Functions

Key	Function
[+], [-], [×], [÷]	Perform addition, subtraction, multiplication, and division Example: 13 **[x]** 2 **[+]** 4 **[=]** gives 30 Example: 9 **[÷]** 3 **[-]** 1 **[=]** gives 2
[=]	Completes all pending operations
[+/-]	Changes the sign (positive or negative) **Example:** 6 **[+/-] [+]** 8 **[=]** gives 2

Key	**Function**
[2nd] [π]	Enters the value **π.**
[x!]	Calculates the factorial of the number. **Example:** 6 **[x!]** gives 720
[%]	Converts the displayed number to a percentage. **Example**: 656 **[%]** gives 6.56
[x^2]	Calculates the square of the displayed number **Example:** 13 **[x^2]** gives 169

Key	**Function**
[y^x]	Raises the displayed number (y) to the power x. Example: 7 **[y^x]** 3 **[=]** gives 343
[(] [)]	Operations in parentheses are given priority over operations outside parentheses. Up to 3 levels of parentheses can be entered. Pressing [=] closes any open parenthetical expressions **Example:** 20 **[÷] [(**] 2 **[+]** 3 **[ )] [=]** gives 4

Key	**Function**
[1/x]	Calculates the reciprocal of the number. Example: 8 **[1/x]** gives 0.125
[2nd] [√x]	Calculates the square root of the the displayed number. **Example:** 144 **[2nd] [√x]** gives 12
[2nd][x√y]	Calculates the specified root (x) of the displayed number (y). **Example:** 125 **[2nd][x√y]** 3 **[=]** gives 5

Key	**Function**
[LOG]	Calculates the common logarithm (to the base 10) of the displayed number. Example: 1000 **[LOG]** gives 3
[LN]	Calculates the natural logarithm (to base *e*) of the displayed number. Example: 3 **[LN]** gives 1.0986122
[2nd] [*e*^{x}]	Calculates the natural antilogarithm (to base *e*) of the displayed number. Example: 4 **[2nd] [*e*^{x}]** gives 54.598150

Key	**Function**
[2nd] [10^{x}]	Calculates the common antilogarithm of the displayed number (10 raised to the power of the number). **Example:** 2 **[2nd][10^{x}]** gives 100
[+] *n* [%] [=]	Adds n% to the displayed number**.** **Example:** 11 **[+]** 10 **[%] [=]** gives 12.1
[-] *n* [%] [=]	Subtracts n% from the displayed number **Example:** 11 **[-]** 10 **[%] [=]** gives 9.9

Key	**Function**
[x] ***n*** **[%] [=]**	Multiplies the displayed number by n%. **Example:** 11 **[x]** 10 **[%] [=]** gives 1.1
[÷]*n* [%] [=]	Divides the displayed number by n%. **Example:** 11 **[÷]** 10 **[%] [=]** gives 110

Using the memory

The calculator's memory can store data as long as the calculator is turned on. You can store a number in memory for repeated use in a calculation or to keep a running total.

Key	Function
[STO]	Stores the displayed number in memory, replacing any previously stored number. **Example:** 15 **[STO] [x]** 2 **[=]** gives 30 (and stores 15 in memory indicated by **"M"** in display).

Key	**Function**
[RCL]	Recalls and displays the number that is in memory. Does not change or clear memory. **Example: [RCL] [+]** 4 gives 19 (15 remains stored in memory as indicated by **"M"** in display).
[SUM]	Adds the displayed number to the current number in memory. Adjusts number in memory without affecting the displayed number or any calculations in progress. Example: 4 **[SUM]** displays **M** 4 **[RCL]** displays **M** 19

Key	**Function**
[EXC]	Swaps the number in memory with the displayed number. The displayed number is stored, and the previously stored number is displayed. (Assuming that 19 now is stored in memory) **Example:** 2 **[x**] 6 **[=]** gives **M** 12. **[EXC]** displays **M** 19. **[EXC]** displays **M** 12.

Note: Pressing **[AC/ON]** or **[CE/C]** will not clear the memory. Pressing zero then **[STO]** or power off **[OFF]** then on **[AC/ON]** will clear memory.

Constant Calculations

The constant key **[K]** simplifies repetitive calculations by storing a number and its associated operation for repeated use.

To enter a constant operation:

1. Enter the repetitive number **“p”.**
2. Press the operation key that is required.
3. Press **[K].**

Key	**Function**
p[+] [K]	Adds “p” to each subsequent entry.
p[-] [K]	Subtracts “p” from each subsequent entry.
p[x] [K]	Multiplies each subsequent entry by “p”.
p[÷] [K]	Divides each subsequent entry by “p”.
p[y^x] [K]	Raises each subsequent entry to power “p”
p[2^{nd}][$\sqrt[x]{y}$] [K]	Takes root “p” of each subsequent entry.

After storing the constant **[K]** you can complete each new repeated calculation by simply entering the new number and pressing **[=]**. To erase the constant, clear the calculator or enter any of the above arithmetic keys.

Setting Angles

Before starting any trigonometric calculation, use the **[DRG]** key to select the appropriate angle units. "**D"** indicates degree units, "**R"** indicates radian units, and "**G"** indicates grad units (1/100th of a right angle).

Key	**Function**
[DRG]	Sequentially changes the angle units (as noted on the display – D, R or G). However, does not affect the displayed angle value.
[2nd] [DRG➔]	Changes the angle unit setting and converts the displayed value to its equivalent value for the new units. Example: 30 D (degrees) 30 **[2nd] [DRG➔]** gives **R** (radians) 0.5235987 **[2nd] [DRG➔]** gives **G** (Grad) 33.333333

Trigonometric Functions

Key	Function
[SIN], COS], [TAN]	Calculates the sine, cosine, or tangent of the displayed angle. **Example**: 45 **[SIN]** = 0.7071067
[2nd][SIN-1], [2nd][COS-1], [2nd][TAN-1]	Calculates the arcsine, arccosine, or arctangent of the displayed angle value. Examples: 0.5 **[2nd][SIN-1]** gives **D** 30. 0 **[2nd][COS-1]** gives **D** 90. 1.0 **[2nd][TAN-1]** gives **D** 45

Degree Format Conversion

Angles measured in degrees, minutes and seconds (**DMS**) must be converted to decimal degrees (**DD**) before it can be used in a calculation.

Degrees, Minutes and Seconds (DMS)

DMS angles are entered in **D.MMSSsss** format:

Example: 52º2'16.75" is entered as 52.021675.

D	Degrees (º) – 0 to 8 digits
.	Decimal point separator
MM	Minutes (') – must be two digits.
SS	Seconds (") – must be 2 digits.
sss	Fractional part of second

Decimal Degrees (DD)
DD angles are entered in a D.ddddddd format.
Example: 28.775º is entered as 28.775

D	Degrees (º)
.	Decimal point separator
ddddddd	Fractional part of a degree.

.

Converting Angles

The **Sci – Plus 200** converts angles from DMS to DD by pressing **[2nd] [>DD]** and DD to DMS by **[2nd] [>DMS]**

Example: Convert 26º5'12.2" to decimal degree (DD) format, and back to degree, minute, seconds (DMS) format.

Format	Keystrokes	Display
DMS format	Enter 26.05122	**26.05122**
DD format	Enter **[2nd] [>DD]**	**26.086722**
DMS format	Enter **[2nd] [>DMS]**	**26.05122**

Rectangular-to-Polar Conversions

Pressing **[2nd][R > P]** converts rectangular coordinates (*x,y*) to polar coordinates (r,θ).

Example: Convert the rectangular coordinates (10,8) to polar coordinates.

Sequence	**Keystroke**	**Display**
Enter x and y	**10 [2nd][x⇔y] 8**	8
Value of θ	**[2nd][R >P]**	12.806248
Value of *r*	**[2nd][x⇔y]**	38.659808
Value of θ	**[2nd][x⇔y]**	12.806248

To alternate between the two converted values (r and θ), press **[2nd][x⇔y]** repeatedly.

Polar-to-Rectangular Conversions

Pressing **[2nd][P > R]** converts polar coordinates (r, θ) to rectangular coordinates (x,y).

Example: Convert the polar coordinates (5, 30°) to rectangular coordinates.

Sequence	**Keystroke**	**Display**
Enter r and θ	**5 [2nd][x⇔y] 30**	30
Value of y	**[2nd][P > R]**	4.330127
Value of x	**[2nd][x⇔y]**	2.5
Value of y	**[2nd][x⇔y]**	4.330127

To alternate between the two converted values (x and y), press **[2nd][x⇔y]** repeatedly.

Statistical Functions

The Sci - Plus 200 can perform statistical analysis on one-variable data.

Key	Function
[Σ+]	Enters the displayed number as a data point in the statistics register.
[2nd] [Σ–]	Removes the displayed number from the statistics register.

Key	**Function**
[2nd] [$\bar{x}$]	Calculates the mean of the entered data set.
[2nd][σn]	Calculates the standard deviation for the entered data (*n* weighting).
[2nd][σn-1]	Calculates the sample standard deviation for the entered data (*n* -1 weighting).
[2nd][σn][x^2]	Calculates the variance using *n* weighting (for the population data).

Key	**Function**
[2nd][σn-1] **[x²]**	Calculates the variance using *n -1* weighting (for the sample data).
[2nd] [Σx]	Calculates the sum of the entered data points.
[2nd][CSR]	Clears all data points from the statistics register and the "**STAT"** indicator.

Example: Analyse the following test scores (88,72,56,77, 91). Assume that these five students are the entire population.

Action	**Keystrokes**	**Display**
Clear display	**[CE/C]**	**0**
Clear statistics register	**[2nd][CSR]**	**0**
1st entry	**88 [∑+]**	**1.**
2nd entry	**72 [∑+]**	**2.**
3rd entry	**56 [∑+]**	**3.**
4th entry	**77 [∑+]**	**4.**
5th entry	**91 [∑+]**	**5.**

Class average (mean)	**[2nd] [$\bar{x}$]**	**76.8**
Standard deviation	**[2nd][σn]**	**12.512394**
Sum of scores	**[2nd] [∑x]**	**384**
Variance	**[2nd][σn] [x^2]**	**156.56**

Important: After completing any statistical calculation, remember to press **[2nd][CSR]** to clear the statistics register and return to arithmetic calculations.

Warranty and Service

Your new **Sci – Plus 200** Scientific Calculator has been built by Sight Enhancement Systems to provide years of reliable service. If your calculator should cause problems for any reason please contact us by

Tel: 519 883-8400 or
Fax: 519 883-8405 or by
Email to: service@sightenhancement.com

will require the serial number from the label on the base of the calculator, and a brief description of the problem.

It is important that you do not return the calculator to the factory without a Return Authorization.

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